# Nuisance Source Tests for Residential Smoke Alarms

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# Project Objective

- *Develop the basis for standard nuisance sources.*

  Currently there are no agreed set of nuisance alarm sources for smoke alarms in any standard. Such a set will be developed and characterized for incorporation into existing test programs

# Test Plan

- Preliminary tests in the 3m by 3m by 2.4m high detector test room w/ planned sources.
- Testing in the manufactured home following the second series of fire tests.
- Fire Emulator/Detector Evaluator tests of selected scenarios.

# Nuisance Scenario Activities

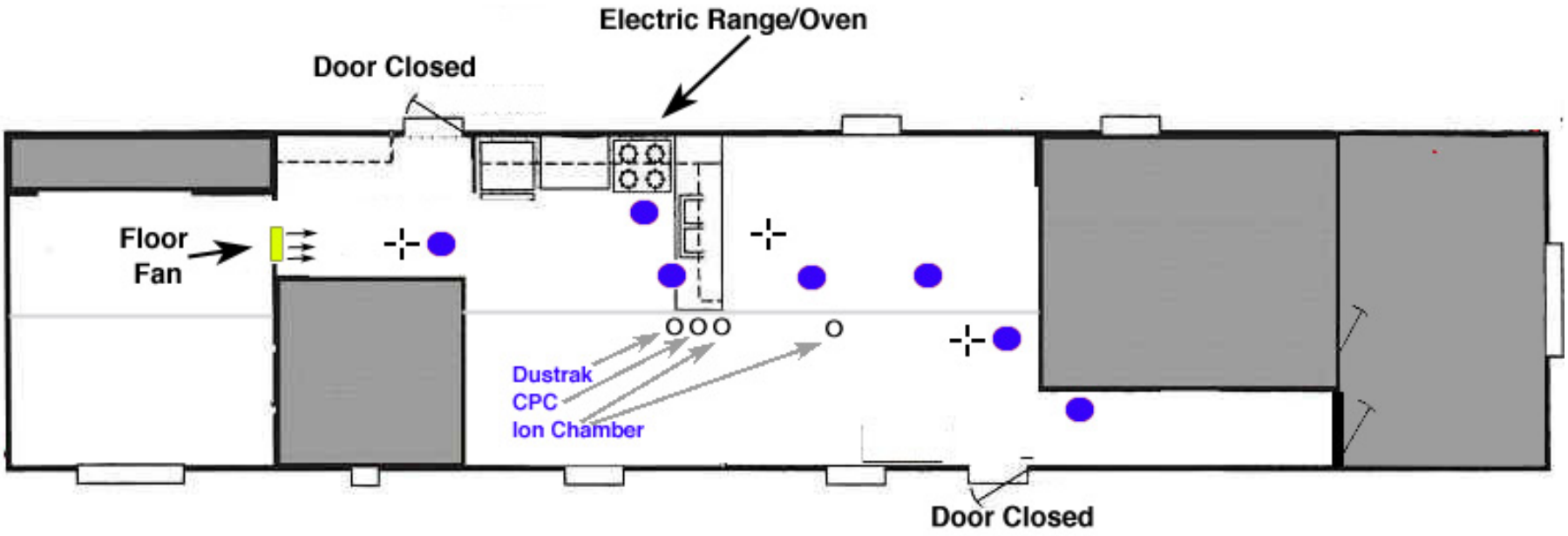
- Toasting
- Frying
  - Electric and gas appliance
- Boiling pasta
- Deep frying
- Baking
- Broiling
- Smoking
- Candles
- Dust exposure
  - ISO test dust in FE/DE
- "Shower steam" exposure
  - High humidity/condensing water vapor in FE/DE

# Scenario Development

- Selection based on what are commonly thought to be causes of residential nuisance alarms.
- Scenarios mimic normal activities (i.e. no intentional food burning except toasted bread).
- Test series does not weight the probability of any given scenario, but is designed to provide data for a variety of scenarios.

# Instrumentation

- Multiple analog Photo/Ion/CO/themistor sensor packages (calibrated NIST modified detectors)
- Ceiling jet velocities
- Humidity and temperature
- Aerosol number and mass concentration
- Flow through Ion chambers (~ MIC)
- Video Record




Photo/Ion/CO
Detector Units

2-D Sonic
Anemometers

Manufactured Home

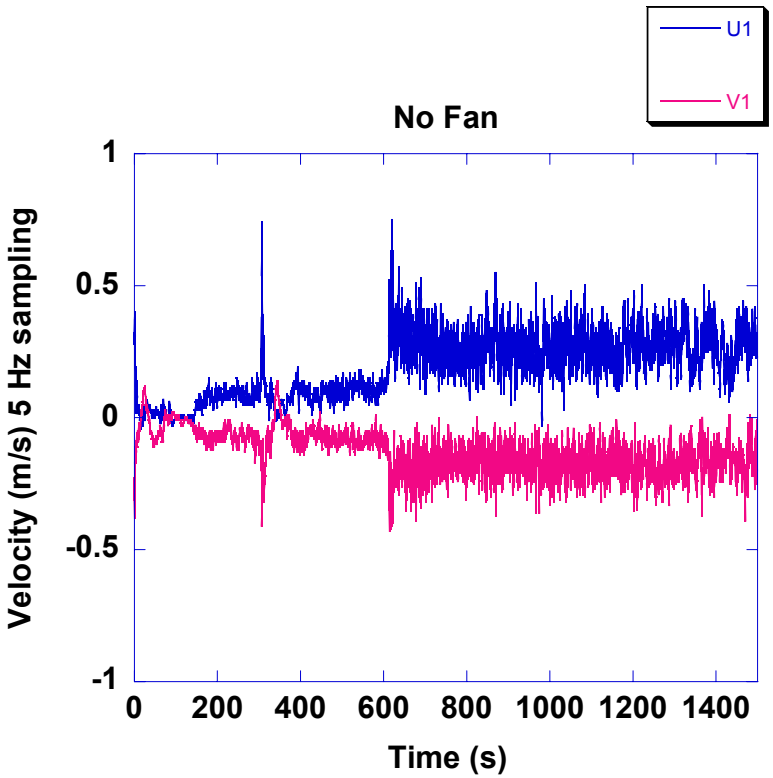
# Range/Oven and LPG Burner

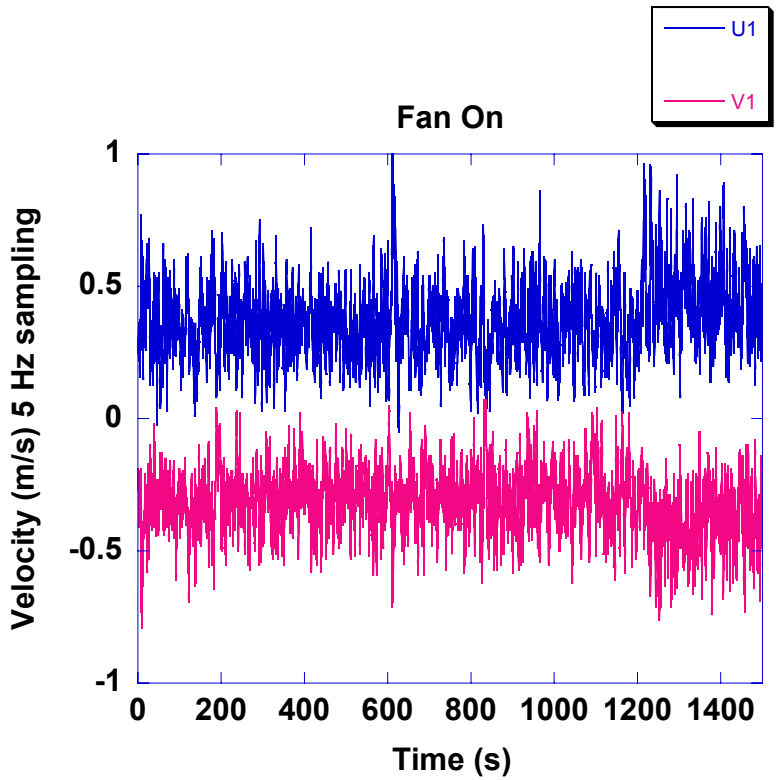
# Detector and Sonic Anemometer

# Living Room Ceiling

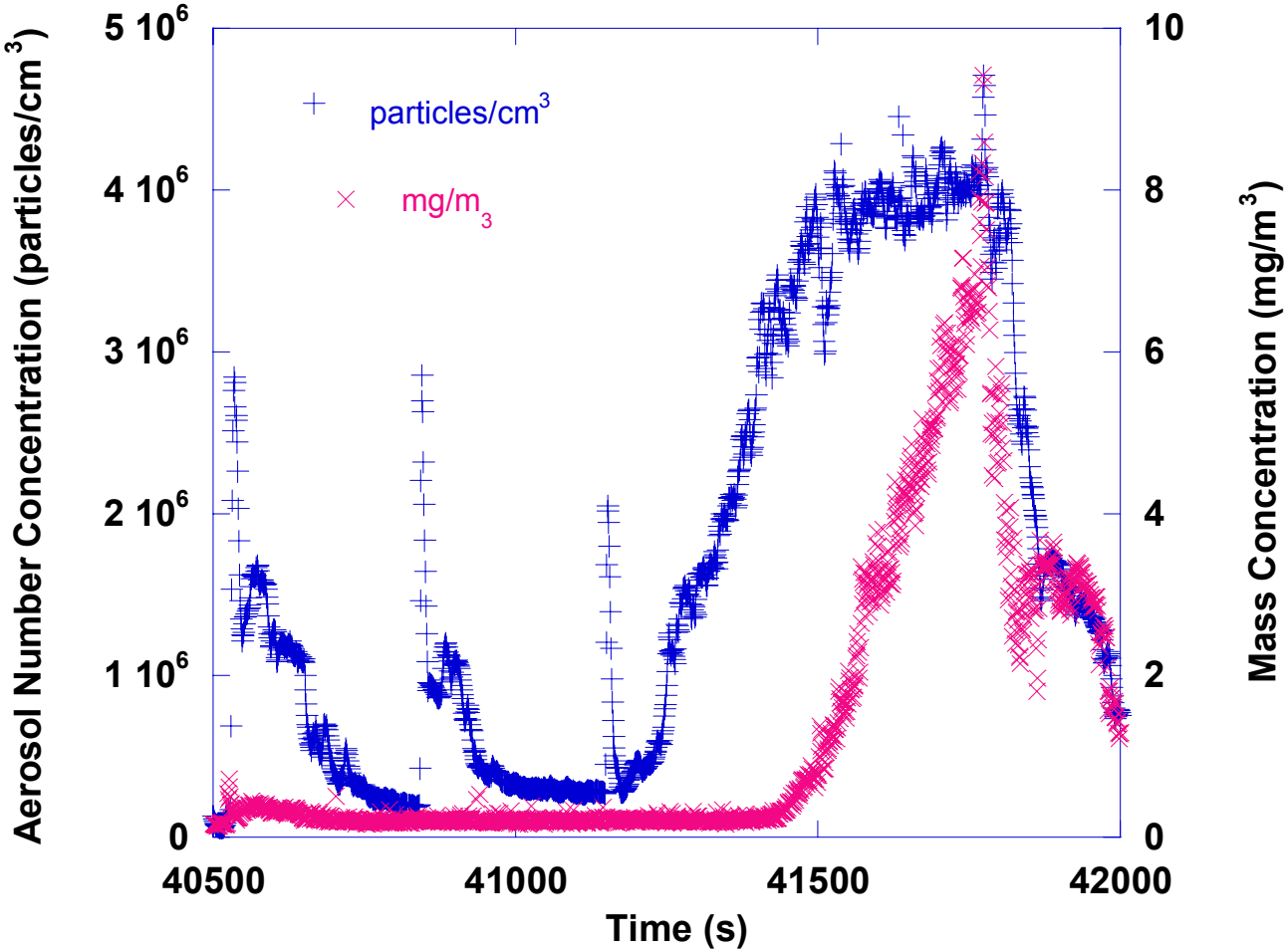
# Floor Fan

# Ceiling Jet Velocity for Pizza Bake/Broil Test



# Pizza Bake/Broil
# Floor Fan Off



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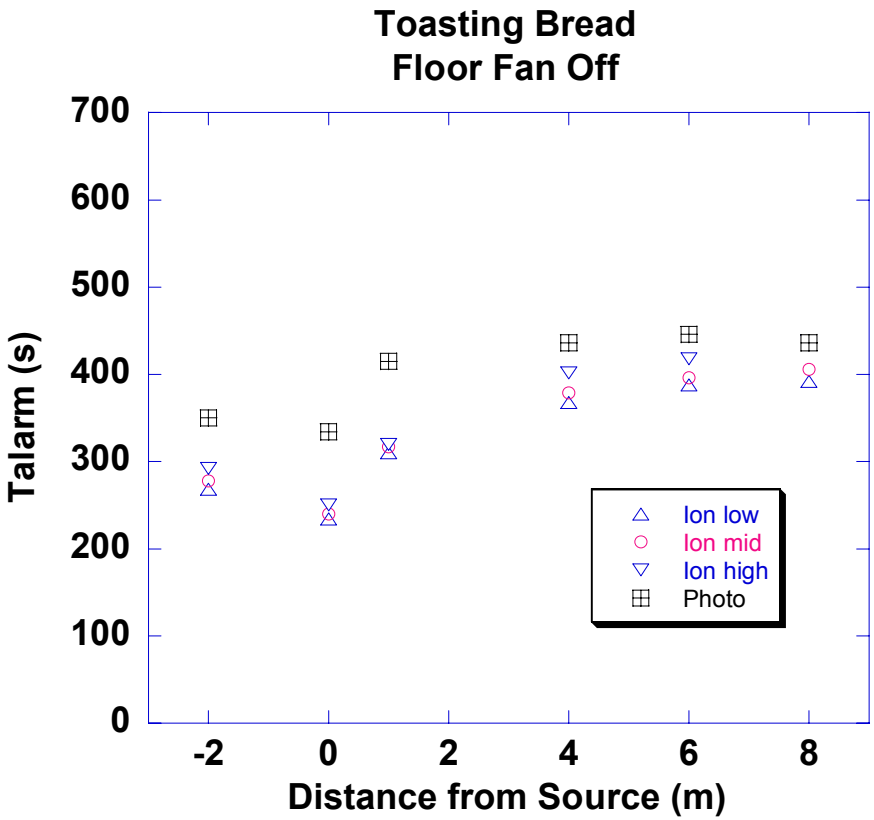
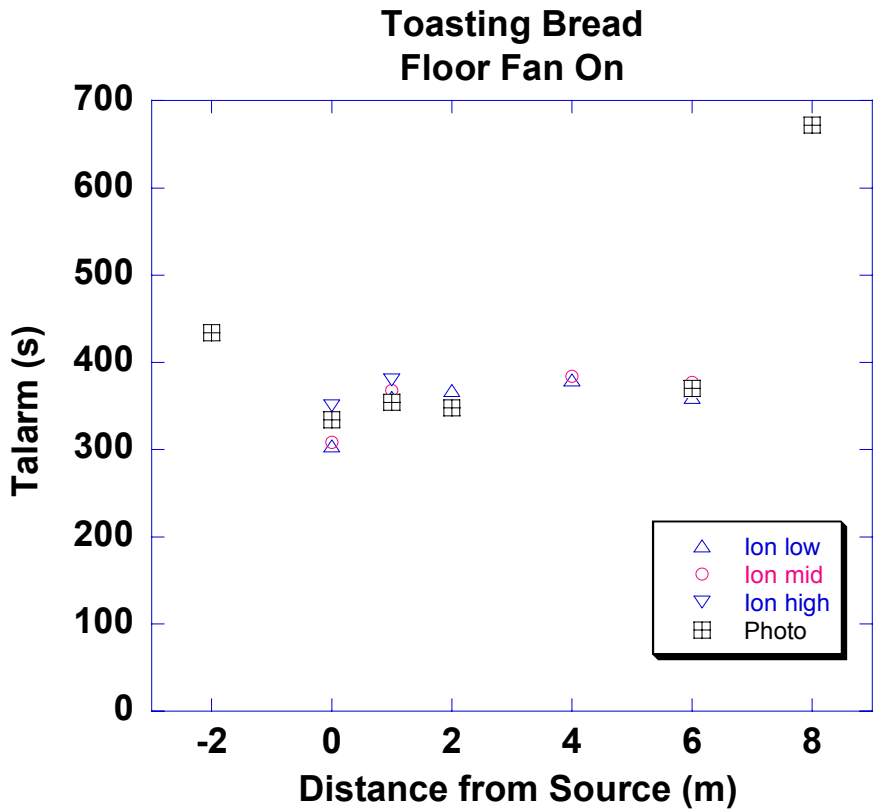
# Toasting Bread

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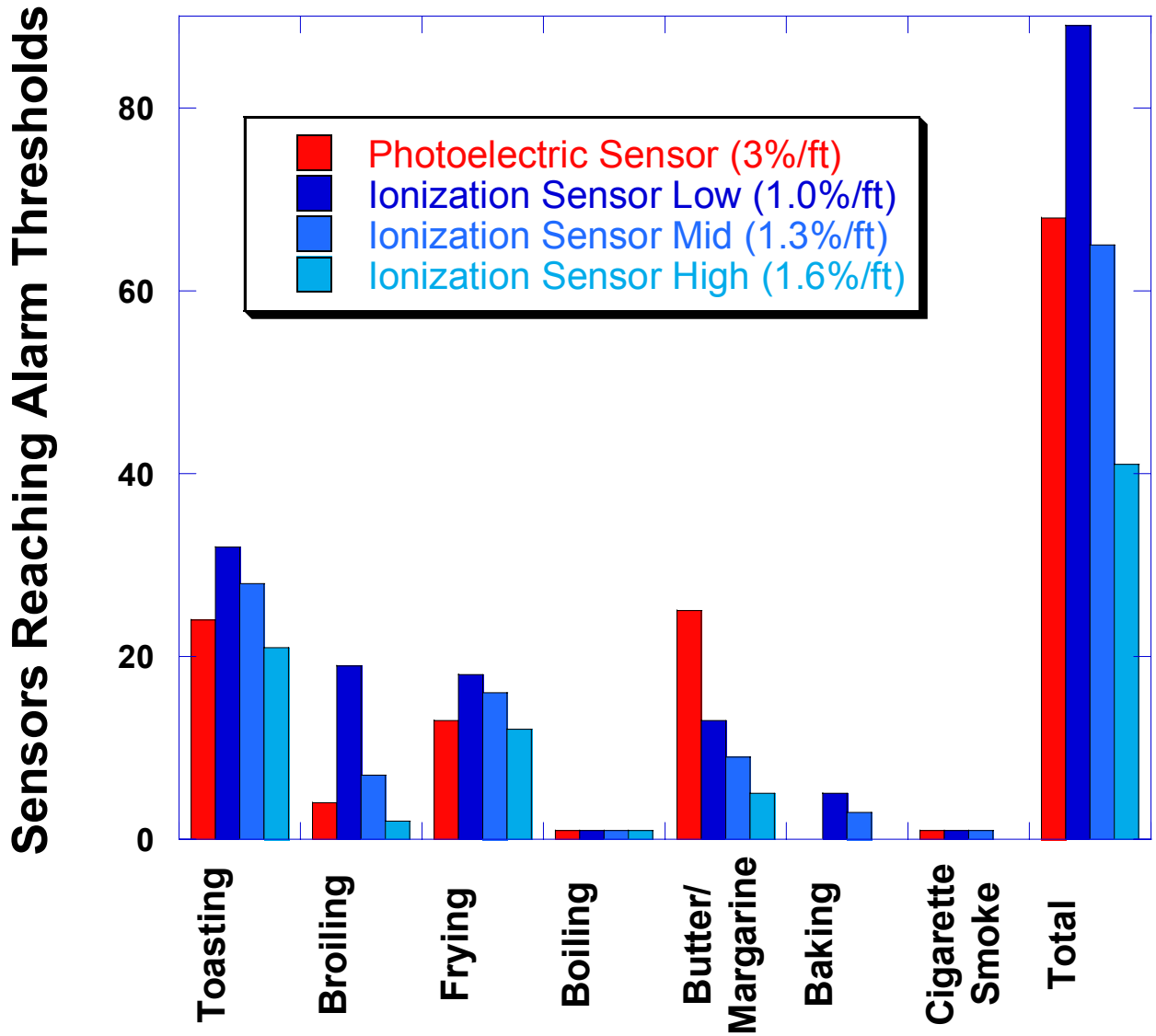
# Alarm Totals for all Scenarios





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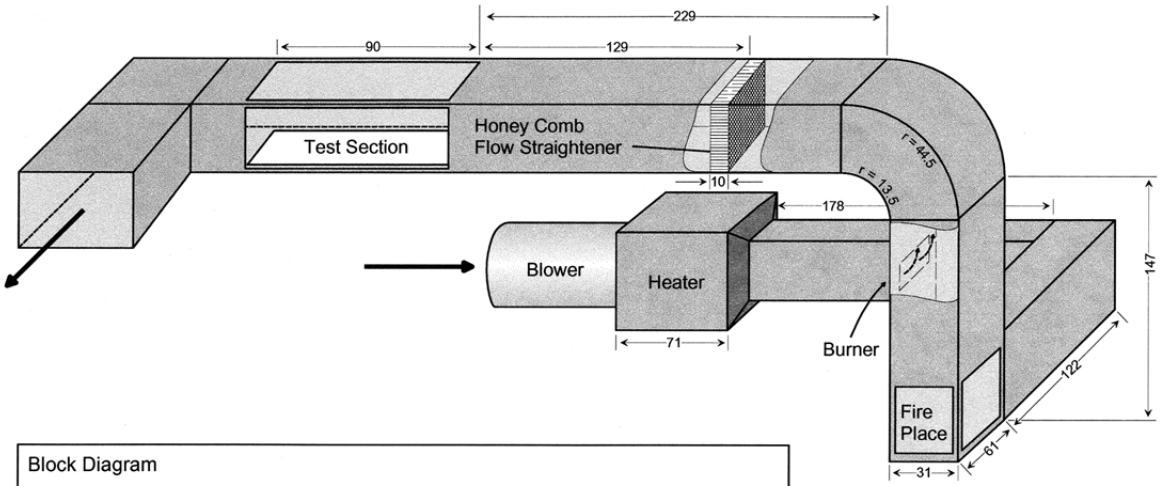
# Summary

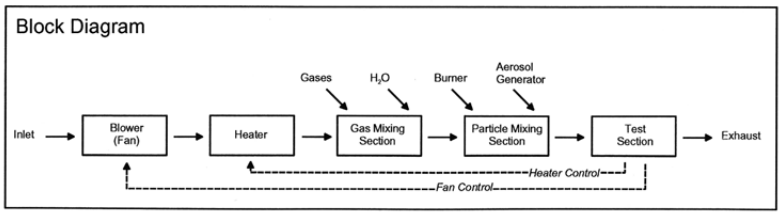
- Both photo and ion alarm levels reached in most of the scenarios
- Detector distance from source has some influence on whether an alarm level is reached, and the time to alarm.
- Increased room airflow tends to dilute aerosol concentrations at detector locations, and reduce the number of ion alarms relative to photo alarms
- Little or no carbon monoxide was sensed in any of the nuisance scenarios

# Next

- Reproduce select scenarios in FE/DE matching flow condition, aerosol concentrations, humidity, and temperature
  - Toasting
  - Frying
  - Tobacco smoke
  - "Shower steam" – condensing water vapor
  - Dust

# Fire-Emulator / Detector-Evaluator

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